REMARKS

Allowable Subject Matter

Applicant thanks the Examiner for the indication that claims 49-98 and 120-123 recite allowable subject matter.

Claim Rejections: 35 U.S.C. § 102(b)

Claims 38-40 and 119 were rejected under 35 U.S.C. § 102(b) as reciting subject matter anticipated by Yao et al. in U.S. Pat. No. 6,052,093.

Claim 38

Claim 38 requires an antenna including an "element" which is "formed from conductor patterns on a plurality of layers." This plurality of layers must include "at least one buried layer of a multilayer PCB." The PCB must be "apertured adjacent to the element," and "the conductor patterns [must be] in stacked relation and interconnected through the PCB."

Yao does not disclose this claim, for several independent reasons.

First of all, in order to find that Yao anticipated claim 38, the Examiner equated the antenna "element" of claim 38 with items 26 and 34 of Yao. But this is improper. Item 26 of Yao is an "antenna ground plane" (4/23) and item 34 is an "electronic circuit ground plane." (4/50) The Applicant in the claims clearly distinguishes between structures that are antenna "elements," and those which are "antenna ground planes." This is demonstrated by claims 39 and 46, which require that the antenna of those claims comprise *both* "an element" *and* "an antenna ground plane" which in view of this recitation necessarily must be *separate from* the antenna element.

Of course, the claims herein are not limited by the embodiments disclosed in the specification, but nevertheless it is significant that Figure 3 is completely consistent with this language usage. Figure 3 illustrates an antenna in which the antenna elements

("an F-shaped region 42 of conductor … on the first layer 40a" and "[o]n the second to eighth layers 40b, …, 40h, an I-shaped region 43b, …., 43h") are separate and distinct from the antenna ground planes ("ground plane areas 41a, …, 41h") (see page 4 of the specification).

Claim 38 does not require an antenna ground plane. In view of the clear distinction in the Applicant's lexicon between antenna "element" and "antenna ground plane," however, as demonstrated above, the antenna "element" in claim 38 cannot be an "antenna ground plane." Thus, Yao item 26, which Yao refers to as the "antenna ground plane," and item 34, which Yao refers to as the "electronic circuit ground plane," cannot be equated with the antenna "element" in claim 38. Because the Examiner relies on both of these "ground planes" to be the antenna "element" of claim 38, and this equation is improper, Yao does not anticipate claim 38.

In addition, and independent of the above, Yao would not anticipate claim 38 for other reasons. Even assuming, contrary to the Applicant's usage of the terms, that an "antenna ground plane" could satisfy the "element" structure of claim 38 (which it cannot), nevertheless Yao's item 34, which is an "electronic circuit ground plane," cannot properly be characterized as part of the Yao antenna. Yao describes this item 34 as being "separated from" (4/50) the antenna ground plane 26, and connected to it at only a single point (4/53-54), in order, among other reasons, to "provide control between the antenna ground current and the transceiver ground current thereby effectively avoiding spurious coupling." (4/60-63) But if the electronic circuit ground plane 34 is not part of the antenna, it follows that the Yao antenna is not "formed from conductor patterns on a plurality of layers," as claim 38 requires. (It would be composed exclusively of antenna ground plane 26 on a single layer.) Moreover, because Yao's antenna ground plane 26 "is fabricated on the surface of the circuit board 16" (4/48-49) Yao does not anticipate claim 38's requirement that the antenna element conductor patterns be on "at least one buried layer of a multilayer PCB." And because antenna ground plane 26 is on a single layer,

Yao furthermore does not anticipate claim 38's requirement that there be conductor patterns in a "stacked relation."

In addition, Yao's device is a slot antenna, which is well understood in the art to be an antenna formed *not* from conductor patterns but rather by the *absence* of conductor patterns in a ground plane. Because Yao discloses a slot antenna, the antenna element in Yao is the combination of slots 22 and 24, which indeed Yao expressly refers to as the "antenna arms" and discloses as being "punched slots in the circuit board 16." (4/19-20) But of course these slots are not comprised of "conductor patterns," as claim 38 requires of the antenna "element."

Finally, claim 38 also requires that the PCB be "apertured adjacent to the element." However, insofar as the slots 22 and 24 *are* the antenna element, it follows that Yao's PCB is not apertured *adjacent to* the element; rather, his aperture is the element itself.

For all of the above reasons, Yao does not anticipate claim 38.

Claim 39

Claim 39 requires all of the features of claim 38, except for the "PCB [being] apertured adjacent to the element." Therefore, claim 39 is not anticipated by Yao for all of the reasons given above with respect to claim 38, except for the reason relating to the PCB aperture being adjacent to the element.

Claim 39 also requires that "an antenna ground plane" comprise "a plurality of vias connecting ground plane regions on respective PCB layers." This leads to a further reason why claim 39 is not anticipated by Yao. Yao clearly states in describing Yao Figure 2 that antenna ground plane 26 and electronic circuit ground plane 34 are connected at exactly one point: transition point 36 (4/52-54). As discussed above, Yao further explains that the connection is intentionally limited to a single point to prevent uncontrolled antenna current spread as well as spurious coupling. (4/57-63). Thus, in the

portion of Yao describing Yao Figure 2, Yao makes clear that there is *not* "a plurality of vias connecting ground plane regions on respective PCB layers." And while Yao's Fig. 7 embodiment shows two transition points 36, 36A, *these two points are on separate and distinct slot antennas*. Yao explains that Fig. 7 shows an embodiment with "two slot antennas." (5/29) Those transition points do not connect ground plane regions of a single antenna ground plane.

For all of the above reasons, Yao does not anticipate claim 39.

Claim 40

Claim 40 depends on claim 39, and therefore is not anticipated by Yao for all of the reasons set forth above with respect to claim 39. In addition, claim 40 requires that "the PCB [be] apertured adjacent to the element." Claim 40 therefore also is not anticipated by Yao for the reason relating to "apertured adjacent to the element" given above with respect to claim 38.

Claim 119

As was true of claim 39, claim 119 requires all of the features of claim 38, except for the "PCB [being] apertured adjacent to the element." Therefore, claim 119 is not anticipated by Yao for all of the reasons given above with respect to claim 38, except for the reason relating to the PCB aperture being adjacent to the element.

Claim 119 also requires that "interconnection [of the conductor patterns be] by vias extending through [a] buried layer of the PCB." As discussed above with respect to claim 39, even if Yao's ground planes 26, 34 are assumed for the sake argument to be antenna element conductor patterns (which they are not), they are interconnected by exactly one transition point 36, not by a plurality of vias. And Yao's Fig. 7 embodiment concerns a device having two separate slot antennas, so transition points 36 and 36A do not interconnect conductor patterns of *an* antenna. Therefore claim 119 is not anticipated by Yao for this reason as well.

Claim Rejections: 35 U.S.C. § 103(a)

Claims 44, 46, and 48 were rejected under 35 U.S.C. § 103(a) as reciting subject matter unpatentable over Yao et al. in view of U.S. Pat. No. 4,975,711 to Lee.

Claim 44

Claim 44 recites a mobile phone including an antenna, where the antenna has the features of claim 38. The Examiner relied upon Yao for the features of claim 44 other than the application to a mobile phone, and relied upon Lee for the use in a mobile phone. Claim 44 therefore is patentable over Yao and Lee at least for the reasons given above with respect to claim 38.

Moreover, Yao specifically points out that his invention is intended for deployment on objects *other than mobile phones*. Yao explains that his invention is an omnidirectional antenna intended for stationary objects that cannot be easily re-oriented to improve signal quality (for example, boxed and piled warehouse inventory). Personal radios, Yao explains, do not need omnidirectional antennas because their users easily optimize reception by moving the devices. (1/21-27) A person of ordinary skill in the art therefore would not have found it obvious to employ Yao's device in a mobile phone.

Claim 46

Claim 46 recites a mobile phone including an antenna, where the antenna has the features of claim 40. The Examiner relied upon Yao for the features of claim 46 other than the application to a mobile phone, and relied upon Lee for the use in a mobile phone. Claim 46 therefore is patentable over Yao and Lee at least for the reasons given above with respect to claim 40.

Moreover, as described above Yao teaches away from the use of the Yao antenna in a mobile phone, and therefore a person of ordinary skill in the art would not have found it obvious to employ Yao's device in a mobile phone.

Claim 48

Claim 48 recites a mobile phone including an antenna, where the antenna has the features of claim 119. The Examiner relied upon Yao for the features of claim 48 other than the application to a mobile phone, and relied upon Lee for the use in a mobile phone. Claim 48 therefore is patentable over Yao and Lee at least for the reasons given above with respect to claim 119.

Moreover, as described above Yao teaches away from the use of the Yao antenna in a mobile phone, and therefore a person of ordinary skill in the art would not have found it obvious to employ Yao's device in a mobile phone.

CONCLUSION

If there are any remaining issues or the Examiner believes that a telephone conversation with Applicant's attorney would be helpful in expediting the prosecution of this application, the Examiner is invited to call the undersigned at the phone number listed below.

Respectfully submitted,

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By /SCOTT E. KAMHOLZ/
Scott E. Kamholz, Reg. No. 48,543
Stephen B. Deutsch, Reg. No. 46,663
FOLEY HOAG LLP
155 Seaport Blvd
Boston, Massachusetts 02210
617-832-1230
Attorneys for Applicant